

High Altitude Ice Fields: A Search for Unique Radar Properties

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An enormous, publicly accessible data set was compiled by the two Shuttle Imaging Radar (SIR-C) missions. Just as features with unique radar polarization signatures have been observed on Venus' highlands (Haldemann *et al.* 1995), and Mars' polar regions (Muhleman *et al.* 1991), we expect that unique sites exist on Earth. Indeed, unique polarization properties of ice have been observed over Greenland (Rignot *et al.* 1993) that mimic the radar properties of Mars' residual south polar cap, and the ice of the Galilean satellites (Ostro *et al.* 1992). We hypothesize that cold ice at high elevations on Earth may also display similar enhancements of the radar echo in the same sense of circular polarization.

We are surveying the SIR-C data set for full polarization images of high altitude ice fields. We are concentrating on locations with significant or full sun-shadowing, and plan to compare radar properties of the ices with different insolation patterns. This investigation is complicated by the nature of the terrain in which we seek our targets: mountainous terrain typically produces foldover or radar-shadowing which we hope to avoid through judicious target site selection, and the use of digitally mapped topography where possible. We will use the full set of Stokes parameters obtained by SIR-C on many of its tracks to reconstruct circular polarization properties of the ices for comparison to planetary studies. We hope to correlate some of our measured values with known models for mountain ice field properties, and perhaps locate and elucidate unique locales.

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